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Postharvest Loss in the Caribbean

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ARTICLE INFO

Article history:

Received 16 January 2016

Accepted 16 May 2016

Keywords: Postharvest loss; critical loss point; Caribbean

ABSTRACT

Postharvest loss is something that affects everyone in the world whether or not they know it. In recent years, more and more research has been devoted to finding ways to reduce and prevent postharvest loss to conserve valuable resources and aid in food security for all. However, much of the research on this topic has been conducted in reference to grain crops in Africa and Asia. It is important to note that postharvest loss affects many other types of food products like fruits and vegetables in places other than Africa or Asia. The Caribbean is one of those places, and many practices, including improved education, need to be implemented there to truly make an impact on postharvest loss there.

INTRODUCTION

A postharvest loss is qualitative or quantitative loss that occurs along a food supply chain. The food supply chain is comprised of several stages such as harvesting, drying, storage, processing, transportation, and retail. Losses occur at each stage, but the criticality of losses in each individual stage may vary among different regions. Each of these stages poses unique challenges, which is why it can be difficult to grasp the entire picture of postharvest loss (Mohammed et al. 2014).

Postharvest loss affects everyone in the world whether they know it or not. The prevention of postharvest loss could have lasting positive impacts on world food security, so it is important to recognize the issues and challenges associated with implementing plans to reduce postharvest loss.

Worldwide, about one-third of food grown for human consumption never makes it to its intended destination as sustenance for humans. This is approximately 1.3 billion tons per year that is lost or wasted. It is also important to note that researchers estimate that only 5% of research dollars associated with agriculture go to postharvest loss projects (“Postharvest loss: a global issue for a growing world” 2014). While much of the work being done in agriculture today is significant, some of it might not even be necessary if postharvest loss was reduced or eradicated. The same amount of resources would still be used to produce food, but there would be one-third more than there is now. In a way, eliminating postharvest loss would allow us to produce more food while using fewer resources.

Another important thing to consider when dealing with postharvest loss is understanding exactly whom it affects the most. While it is

something that impacts the entire world in some form or another, it affects those in developing countries the greatest. According to ADM Institute for the Prevention of Postharvest Loss's Periodic Report, "Postharvest loss increases food prices and reduces farm income, particularly for smallholder farmers who have little access to credit, and little capacity for storage" (ADM Institute for the Prevention of Postharvest Loss 2015). Many times it hits smallholder farmers twice as hard, because as a producer, they lose commodities due to poor practices. This reduces their income, and then there is not enough available food for consumers (Rodin 2015). The postharvest loss in Sub-Saharan Africa, a set of developing countries, could feed 48 million people ("Postharvest loss: a global issue for a growing world" 2014). In fact, the amount of food lost due to postharvest loss in parts of Sub-Saharan Africa is more than the total food aid distributed across that region (Cousin 2015).

Postharvest Loss in the Caribbean

While much of the research on postharvest loss is done in Africa and Asia because of their high grain production and subsequent loss, there are other developing regions of the world that struggle with postharvest loss. Many of these places are overlooked because they produce products that do not feed as many people or stretch as far as grain, such as fruits and vegetables. The Caribbean nations of Trinidad and Tobago, Guyana, and St. Lucia suffer major losses in their main commodities of cassava, mango, and tomato. In the cases of Trinidad and Tobago and St. Lucia, reducing postharvest loss is particularly critical because they are island nations, which makes it incredibly expensive to import extra food.

Trinidad and Tobago

Critical loss points were identified in Trinidad and Tobago by a 2014 study sponsored by FAO in the

production of cassava. The first critical loss point (CLP) was in the field harvesting stage, the second CLP was in the packinghouse stage, and the third CLP was in the retail marketing stage. At CLP #1, it was estimated in the study that there was a 3.5% loss in the harvesting stage alone (Mohammed et. al 2014). A major reason for this is a lack of harvesting technology. Many smallholder farmers are still harvesting cassava roots using a machete or by hand, which can significantly damage the root. Even if the root is not rendered completely useless due to damage, the damaged spots are welcoming to the infection of insects or fungus. Some mid- and large-sized farms are implementing more efficient harvesting technology, but the effects of these newer processes have not yet been quantified ("Post-harvest losses in Latin America and the Caribbean" 2013). Overall, the total postharvest loss of cassava in Trinidad and Tobago is 20% (Mohammed et al. 2014).

The critical loss points identified for cassava are also the same for tomatoes in Trinidad and Tobago. The total loss is 27% and is broken down into 7% loss in the harvesting stage, 8% loss in the packaging stage, and 12% loss in the retail stage (Mohammed et al. 2014). When harvested, tomatoes are often thrown into piles on the bare soil at the collection points, which damages the produce and invites pests. In the packaging stage, tomatoes are often put in sub-par crates that are stacked on top of each other. By the end of the day, the tomatoes at the bottom have become tomato soup. In the retail stage, tomatoes are often subjected to the elements; the tomatoes are nearly baked in the sun at roadside stands, rendering them useless ("Post-harvest losses in Latin America and the Caribbean" 2013).

Mango production faces similar challenges as tomato production in Trinidad and Tobago

("Post-harvest losses in Latin America and the Caribbean" 2013). The total postharvest loss of mangos is at about 17% (Mohammed et al. 2014). Some things that contribute to this are improper storage conditions and lack of preservation methods. Like with tomatoes, mangos are placed in inadequate crates and not in properly cooled areas. There are also no sanitizing agents or waxes applied to the fruits, which reduces their shelf lives ("Post-harvest losses in Latin America and the Caribbean" 2013).

Guyana

Guyana is a country on the northern coast of South America, but because of its proximity and similarities to the Caribbean countries, it is a part of the Caribbean Community, otherwise known as "CARICOM." Like Trinidad and Tobago, it produces cassava, tomatoes, and mangos that face significant postharvest loss. The critical loss points identified in Guyana mirror those in Trinidad and Tobago according to each commodity (Mohammed et al. 2014).

The total postharvest loss for cassava in Guyana amounted to US \$840,000. This represented a 23% loss. Six and a half percent comes from the harvesting stage, 2% comes from the packaging stage, and 14.5% comes from the retail stage (Mohammed et al. 2014). Some of the main reasons for these losses are incorrect harvesting times and cassava's short shelf life. There is a lack of education amongst smallholder farmers in regard to proper harvesting times and techniques. Cassava left in the field past its maturity loses starch, degrading its quality. Cassava is also only good for three to five days after harvesting, which is why there is such a significant loss in the retail stage ("Post-harvest losses in Latin America and the Caribbean" 2013).

Guyana's postharvest loss of tomatoes is at 34%, which equals about US \$7.9 million. Not only does

this significant loss mean there is less food in total, it also means the smallholder farmers who need it the most lose out on US \$7.9 million per year. Nine and a half percent were lost due to physical issues, 7.5% was due to physiological issues, and the remaining 17% was due to pathological and entomological problems (Mohammed et al. 2014).

In Guyana, 'Buxton Spice' is the top variety of mango, and there was a postharvest loss of 32%. Fifteen percent was lost in harvest and the remaining 17% was lost in the packaging stage (Mohammed et al. 2014). The harvesting techniques used in Guyana are pretty crude. Sometimes, young boys will climb the trees and throw mangos down to the ground. Not only does this damage the fruit from the impact, but it also opens it up to contamination from being on the bare ground. Other times, the tree is shaken or the mangoes are knocked off with poles, which also damage them. In the packinghouse, the mangoes are often not treated with care, and sometimes it is discovered they are infested with bugs or other pathogens in this stage (Ramdin & Humme 1993).

St. Lucia

Only postharvest loss of mangos and tomatoes was studied in St. Lucia. Regardless of the commodity, most of the postharvest loss in St. Lucia is due to inadequate storage facilities, whether it is for raw or semi-processed products. The country just does not have the infrastructure to handle the amount of fruits, vegetables, and grains it produces. This is especially evident in years of high yield, because so much food is lost. Another part of the postharvest loss is due to lack of farmer education. Although St. Lucia has a national agriculture department, they have trouble

reaching the smallholder farmers (Ramdin & Humme 1993).

For tomatoes, there is an overall postharvest loss of 20%, broken down into the following categories: 7% occurs at harvesting, 8% occurs in packaging, and 5% occurs in the retail markets. For mangos, 23% is lost postharvest. Both of these

losses contribute significantly in terms of economic losses. In total, nearly US \$250,000 worth of these two items alone is lost in St. Lucia (Mohammed et al 2014).

CONCLUSIONS

The research on postharvest loss in the Caribbean is significant because it aids in problem identification for a geographical area that is not the subject of many studies. It highlights the areas that need the most work first. In the cases of Trinidad and Tobago, Guyana, and St. Lucia, many of the problems lie in education. The amount of loss due to physical damage is staggering. From an American perspective, it seems silly that the farmers would throw their produce around, but most of the time the producers in these developing countries do not even know it gets damaged. This is because the products leave their farms at the end of the day and they never see or hear about the produce again. There is an even larger disconnect between the farmer and end consumer in developing nations than there is in America.

Not only is there a lack of education in terms of the process of getting the food from the farm to the table, there is also a lack of understanding of plant life cycles. As is in the case of cassava harvesting in Guyana, many producers lack the technical knowledge necessary to make the best decisions about planting, harvesting, and other things.

There is a tremendous need for agricultural and consumer education in developing countries. According to the World Food Programme (2013), "Education is critical to achieve lasting change on post-harvest management and consequently key to reducing food losses in sub-Saharan Africa." As

stated earlier, much of the research is being done in Africa, but regarding education, many of the same principles will hold true in the Caribbean. The World Food Programme has been implementing training on the grain drying process in small villages in Burkina Faso that many smallholder farmers call home. As of 2013, more than 170 families in Burkina Faso alone had attended these training programs that educated them about the best post-harvest practices.

Another example of an educational program making progress in the area of postharvest loss production is Scientific Animations Without Borders (SAWBO), based out of the University of Illinois Urbana-Champaign. The program creates short, animated educational videos about proper agricultural practices, among other topics. One of the first topics addressed by SAWBO was the use of neem tree seed oil as a natural insecticide. Although neem trees are indigenous to much of Africa, only a small number of farmers knew of the capabilities of the seed oil (Bello-Bravo & Pittendrigh 2013). The SAWBO video explained the basic purpose of the neem seed oil (as an insecticide) and the process of extracting the oil. Of the 26 surveyed participants, 100% claimed they liked the video. Seventeen were willing to put what they had learned into practice, six wanted to use the information to train others, and another three people wanted to do both. Based off of this data, the preliminary trials of

SAWBO were considered very successful and more topics are constantly being added (Bello-Bravo et al. 2013).

These programs, if administered through the government or public research organizations, could distribute the information that is already available efficiently and effectively through after school youth groups, workshops, and informational pamphlets. Through the youth groups, the young people in the community can begin learning the best practices for when they grow older and take on their own farms. The workshops and pamphlets would be beneficial for current farmers to learn information that pertains to their careers.

Many of the solutions to postharvest loss seem so basic, such as putting grain in bags or putting delicate produce in rigid crates, but are beyond the reach of developing countries. Many of them lack the infrastructure and economy to deal with those issues properly. Although there are several private organizations that provide funding and training for new products like crates or bags, there are still significant problems because one-third of food is lost.

Products in the retail stage are lost because the sellers do not protect their goods like they should. Having produce sit outside all day baking in the sun causes both the producer and consumer to lose out on necessary food or income. There are also concerns over the grading and quality control systems in place within these countries. Marketable specimens may be thrown out, while unmarketable specimens are kept with the “good” samples, therefore increasing the risk of spoiling the whole batch. Again, both lack of education and lack of appropriate storage materials and infrastructure both play a huge role in this. Postharvest losses affect everyone in some way,

though developing countries are usually hit hardest.

Reflection

Before attending the First International Congress on Postharvest Loss Prevention, I was not fully sure what postharvest loss was. Even now, I still have plenty of questions about the issue because it is such a broad, complex topic. However, I have a much better grasp about postharvest loss in general and feel like I better understand the effects postharvest loss can have globally.

I do not fully know what the action plan will have to be to eliminate postharvest losses, but I do know that the plan is going to have to start with the producers. It will do no good to implement major changes in the retail stage if stores and markets are still getting the same, low-quality goods. Educating the farmers and giving them incentives to improve their practices will be most important in jumpstarting the reduction of postharvest losses. Only after issues are resolved with the farmers can we start really focus on the later stages of the supply chain.

Reducing and eliminating postharvest losses is going to have to be a worldwide effort. It is absolutely necessary to feed the world's exponentially growing population, because increasing yields through biotechnology and best practices will not be enough. However, after researching postharvest losses, I am confident we can implement comprehensive postharvest loss prevention plans that include aspects such as education and infrastructure.

The First International Congress on Postharvest Loss Prevention will be a key event in developing an action plan to reduce postharvest loss. It brought some of the brightest individuals from

62 different countries together to discuss issues related to postharvest loss. I certainly thought that each speaker brought a unique perspective to the table, and that the roadmap sessions at the end accurately summarized the results of the congress. We set goals for the amount of reduction we think is attainable by certain years, and highlighted steps to take to reach those goals. With so many more people now aware of challenges facing postharvest loss, I am confident that we will reduce postharvest loss by at least 30% by the year 2050.

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